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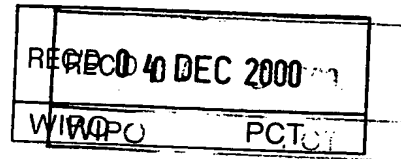
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PCT/EP 00 / 07196



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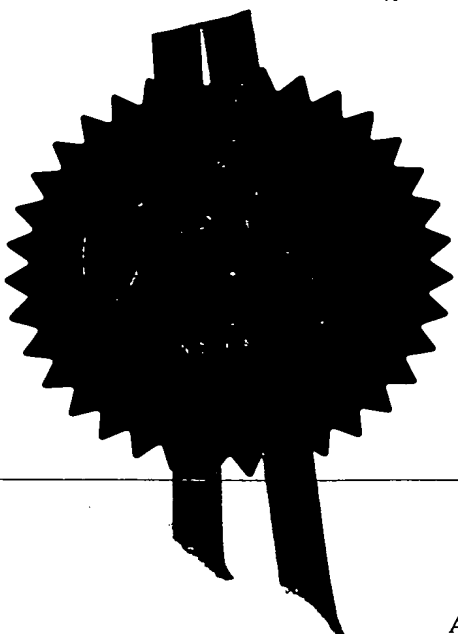
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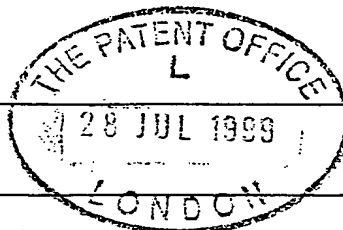


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1. Your reference

P/692

2. Patent application number

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9917729.7

3. Full name, address and postcode of the or of each applicant (underline all surnames)

THE BOOTS COMPANY PLC  
1 THANE ROAD WEST  
NOTTINGHAM  
NG2 3AA

Patents ADP number (if you know it)

If the applicant is a corporate body, give the country/state of its incorporation

UNITED KINGDOM

4. Title of the invention

HAIR CARE COMPOSITION

5. Name of your agent (if you have one)

MRS E J SMITH

"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)

THE BOOTS COMPANY PLC  
GROUP PATENTS DEPARTMENT - D31  
1 THANE ROAD WEST  
NOTTINGHAM NG2 3AA  
UNITED KINGDOM

Patents ADP number (if you know it)

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Country

Priority application number  
(if you know it)

Date of filing  
(day / month / year)

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application

Date of filing  
(day / month / year)

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? (Answer 'Yes' if:

YES

- a) any applicant named in part 3 is not an inventor, or
  - b) there is an inventor who is not named as an applicant, or
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- See note (d))

Patents Form 1/77

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Continuation sheets of this form

Description 27

Claim(s)

Abstract

Drawing(s)

10. If you are also filing any of the following, state how many against each item.

Priority documents

Translations of priority documents

Statement of inventorship and right to grant of a patent (Patents Form 7/77)

Request for preliminary examination and search (Patents Form 9/77)

Request for substantive examination (Patents Form 10/77)

Any other documents (please specify)

11. I/We request the grant of a patent on the basis of this application.

Signature

E. J. Smith

Date

28.07.99

12. Name and daytime telephone number of person to contact in the United Kingdom MRS E J SMITH (0115 959 4585)

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# HAIR CARE COMPOSITION

5 The present invention relates to hair care compositions having protecting and conditioning properties, to methods of preparing such compositions and to methods of using such compositions to treat hair.

10 The hair is exposed to a number of environmental challenges. Such exposure can generate free-radicals, especially on exposure to sunlight and/or heat, and presence of high concentrations of free radicals is generally seen as undesirable in a toiletries composition and when used on the hair. Free radicals, which are generated by factors such as UV radiation (present in sunlight), heat and/or by chemical reaction, are implicated in the process of damage to hair, reduction in shine, poor feel, and fading of hair colour.

15 There are a number of haircare compositions, commercially available, which seek to minimise the damage to the hair by the inclusion of certain agents. In particular materials such as vitamins and herbal extracts have widely been known to reduce the formation of free-radicals. However to achieve good efficiency high levels of these materials have to be used and this can result in dark aesthetically unpleasing products that can stain the hair

20 The hair care compositions of the present invention have been shown to protect the hair more effectively from free radicals and are cosmetically and aesthetically more suitable than known hair care compositions. Therefore the hair care compositions of the present invention may be used to provide improved protection against damage to hair caused by exposure to factors such as sunlight, environmental and/or atmospheric pollution, heat from styling the hair and/or chemical treatment of the hair (for example curling, perming, 25 straightening, dyeing and/or bleaching). The hair care compositions of the present invention may comprise conventional hair care products and/or specific hair protection products which may be used for example as protective pre-treatments prior to heat or chemical treatment of the hair.

30 The term "hair care composition" as used herein includes so-called "hot oil" treatments, shampoos, conditioners, hair dyes, mousses, foams, gels, creams, waxes, masks, muds, styling sprays, lotions and rinses, all suitable for use on

animals, preferably on humans, most preferably on the human head.

Therefore broadly according to the present invention there is provided a hair care composition containing a combination of anti-free-radical ingredients that when combined together give a synergistic improvement in activity allowing improved protection and condition to be provided for the hair without the drawback of aesthetically unpleasant product appearance and the chance of hair staining.

The present invention discloses hair care compositions containing a synergistic mixture of two or more anti free radical agents and a suitable diluent or carrier. Particularly preferred are hair care compositions containing a synergistic mixture of three anti free-radical agents and a suitable diluent or carrier. The agents used in the present invention are already known for their ability to quench free radicals and prevent oxidative damage to the hair. However the present invention discloses that certain combinations of these agents have an efficacy out of all proportion to that expected. This has been demonstrated by both *in vivo* and *in vitro* testing.

Suitable anti-free-radical agents may include:

a) ascorbic acid its salts and esters, particularly sodium ascorbyl phosphate, magnesium ascorbyl phosphate and ascorbyl palmitate

b) vitamin E (tocopherol) and its esters, particularly tocopheryl acetate

c) herbal extracts, particularly ginkgo biloba, such as that available under the trade name "Ginkgo Biloba Leaf Powder" from Univar PLC, morus alba, such as that available under the trade name "Mulberry Concentrate" from Aston Chemicals, origanum vulgare, such as that available under the trade name "Pronalen Origanum HSC" from S Black Ltd, panax ginseng, such as that available under the trade name "Ginseng 1.1 extract 4294" from S Black Ltd, birch extract such as those available from Cosmetochem (U.K.) Ltd under the trade names "Super Herbasol Extract Birch" and "HP Herbasol Betula" and those available from Blagden Chemicals under the tradenames "Phytelene of Birch" and "Aqueous Spray Dried Birch". and camellia sinensis, such as that available under the trade name "Herbal Extract Green Tea 75% Solids" from

Nichimen Europe.

5 The source of the anti free-radical activity in some of these products is often not fully understood; for example, it is believed that the anti-free-radical activity of ginkgo biloba extract arises from the presence of flavonglycosides and/or terpenelactones which may be free-radical inhibitors. Birch extract may be produced by extracting the dried leaves of *Betula alba* with a suitable solvent. It is believed that the anti-free radical activity of birch extract arises due to the presence of flavonoids such as hyperosid, quercitrin and/or myricetin-3-digalactosid which may be free-radical inhibitors. Such products are then often sold as mixtures or solutions.

15 Thus the anti-free-radical agent may consist of a number of active ingredients which are free-radical inhibitors or may also comprise suitable diluents and/or carriers (such as when the anti-free radical agent is some of the products mentioned herein). Thus there may be some confusion as to the actual level of agent within a commercially available product. Accordingly, the amounts of anti free-radical agents used in the present invention are expressed as dry weights, as understood by a man skilled in the art.

20 The total amount of anti-free radical agents present in the composition may range from 0.005% to 10% by weight. Where the synergistic mixture of anti free-radical agents is comprised solely of herbal extracts, then a preferred total amount of anti free-radical agents is 0.005% to 1%w/w, most preferably 0.01% to 0.05% by weight of the composition.

25 Preferably, the individual anti-free-radical agents that comprise the synergistic mixtures may be present in an amount of from about 0.001% to about 10% by weight, more preferably from about 0.003% to about 5% by weight of the composition.

30 Particularly preferred synergistic combinations of anti free-radical agents suitable for inclusion in a hair care composition are:

35 *Origanum vulgare*, sodium ascorbyl phosphate and one of *Morus alba* or *Panax ginseng*

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Panax ginseng, morus alba, and one of magnesium ascorbyl phosphate, sodium ascorbyl phosphate or camellia sinensis.

5      Origanum vulgare, panax ginseng and one of rosmarinus officinalis or ascorbyl palmitate.

Origanum vulgare, morus alba and one of rosmarrinus officinalis or magnesium ascorbyl phosphate.

10      Camellia sinensis, magnesium ascorbyl phosphate and panax ginseng.

Tocopheryl acetate, ginkgo biloba and one of panax ginseng or morus alba.

15      A hair care composition containing a synergistic combination of anti free-radical agents has a multitude of advantages. Such anti free-radical agents are usually highly coloured. If they are used in amounts necessary to be totally effective, it is likely that the hair care composition would stain both skin and clothes and would dye the hair. Further, even at lower levels the agents give the composition a cosmetically unacceptable appearance. Thus most conventional  
20      hair compositions use less of an anti free-radical agent than necessary to provide total protection. With the present invention because of the increased efficacy of the synergistic mixture of anti-free radical agents it is possible to include the anti free-radical agents in sufficient amounts to provide an effective defence against the action of free radicals. Thus use of the composition will give  
25      the users hair improved shine, feel, manageability, flexibility, colour and will help protect the hair from damage. All this is provided without the aforementioned disadvantages of staining, dyeing and unacceptable cosmetic appearance.

30      Alternatively, if the same level of protection as a conventional formulation is required, then the increased efficacy of the synergistic mixture of anti free-radical agents means that the composition will require much lower quantities of the anti free-radical agents than a conventional formulation. Not only are any problems with highly coloured formulations reduced (staining, dyeing, cosmetic appearance), but the cost of the formulation is likely to be cheaper as well.

35      To further reduce the generation of free-radicals by the UV radiation in sunlight, compositions of the present invention may further comprise any

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acceptable sunscreensing agent (that is an agent which acts to absorb and/or reflect UV radiation present in sunlight) and which would be acceptable for use in a hair-care composition (for example suitable for use on the human head). Such sunscreensing agents may comprise inorganic sunscreens (for example zinc oxide and/or titanium dioxide preferably of microfine (< 100 nm) particle size) and/or organic sunscreens (for example p-aminobenzoic acids, esters and derivatives, methoxycinnamate esters, benzophenones [such as benzophenone-4 {available commercially under the trade name Uvinul MS40}]; dibenzoylmethanes and/or salicylate esters). The sunscreensing agents may be present in an amount of from about 0.1% to about 10% by weight of the composition.

Further components may be added to the hair care composition as is well-known to those skilled in the art.

For example, preservatives may be added to the composition such as 2-bromo-2-nitropropane-1,3-diol (bronopol, which is available commercially under the trade name Myacide RTM), benzyl alcohol, diazolidinyl urea, imidazolidinyl urea, methyl paraben, phenoxy ethanol, propyl paraben, sodium methyl paraben and sodium propyl paraben, suitably in an amount of from about 0.01% to about 10% by weight of the composition.

Thickeners and viscosity modifying agents may be added to the composition, such as amine oxides, block polymers of ethylene oxide and propylene oxide (for example, those available from BASF Wyandotte under the trade name "Pluronic" RTM), ethoxylated fatty alcohols, cellulosic derivatives such as hydroxypropylmethyl cellulose, salt (NaCl), phthalic acid amide, polyvinyl alcohols and fatty alcohols, suitably in an amount of from about 0.5% to about 10% by weight of the composition.

Sequestering agents may be added to the composition, such as ethylenediamine tetraacetic acid and salts thereof, suitably in an amount of from about 0.005% to about 0.5% by weight of the composition.

The composition may also include resins such as: octylacrylamide / acrylates / butylaminomethacrylate copolymer (available under the trade name Amphomer RTM); ethyl ester of polyvinylmethyl (hereinafter known as PVM) /

methacrylate (hereinafter known as MA) copolymer (available under the trade name Ultrahold 8A RTM); vinyl acetate (hereinafter known as VA) / crotonates / vinyl neodecanate copolymer (available under the trade name Adhesive 28-2930 NAL); acrylates / acrylamide copolymer (available under the trade name Gantrez ES225 RTM); vinyl acetate / crotonic acid / vinyl propionate copolymer (available under the trade name Luviset CAP RTM); polyvinylpropionate (hereinafter known as PVP) / VA / vinylpropionate copolymer (available under the trade name Laviskol VAP RTM); octylacrylamide / acrylate copolymer (available under the trade names Versatyl 90 RTM or Lovocryl 47 RTM); vinyl caprolactam / PVP / dimethylaminoethyl methacrylate copolymer (available under the trade name (H<sub>2</sub>O LD EP-1); PVM / MA copolymer (available under the trade name Gantrez RTM); and vinyl acetate / butyl maleate / isobornyl acrylate copolymer (available under the trade name Advantage CP RTM). These resins may be present suitably in an amount of from about 0.1% to about 10% by weight of the composition.

The composition may also include slip aids such as phenyl trimethicone, suitably in an amount of from about 0.1% to about 10% by weight of the composition.

The composition may also include vitamins such as biotin, suitably in an amount of from about 0.01% to about 1.0% by weight of the composition.

The composition may also include waxes such as cocoa butter suitably in an amount of from about 1% to about 99% by weight of the composition.

The composition may also include gelling agents such as PVM, MA, or a decadiene crosspolymer (available under the trade name Stabizez 06), suitably in an amount of from about 0.1% to about 2% by weight of the composition.

The composition may also comprise suitable, cosmetically acceptable diluents, carriers and/or propellants such as dimethyl ether.

The composition may also include pearlising agents such as stearic monoethanolamide, suitably in an amount of from about 0.01% to about 10% by weight of the composition.

Perfumes may be added suitably in an amount of from about 0.01% to about 2% by weight of the composition, as may water soluble dyes such as tartrazine, suitably in an amount of from about a trace amount (such as  $1 \times 10^{-5}$  %) to about 0.1% by weight of the composition.

5

The composition may also include pH adjusting agents such as sodium hydroxide, aminomethyl propanol, triethanolamine, suitably in an amount of from about 0.01% to about 10% by weight of the composition.

10 The composition may be buffered by means well known in the art, for example by use of buffer systems comprising succinic acid, citric acid, lactic acid, and acceptable salts thereof, phosphoric acid, mono- or disodium phosphate and sodium carbonate. Suitably, the composition may have a pH between about 3 and about 10, preferably between about 4 and about 8.

15

The composition may also include an antidandruff agent such as salicylic acid or zinc pyrithione or octopyrox suitably in an amount of from about 0.1% to about 5% by weight of the composition.

20 Surfactants may be included, such as cosmetically acceptable salts of alkyl ether sulphates, alkyl and alkylamidoalkyl betaines, ethoxylated alcohols, polyethyleneglycol carboxylates, acceptable salts of alkyl sulphates (such as ammonium lauryl sulphate), acceptable salts of alkyl ether sulphates (such as ammonium laureth sulphate or sodium laureth sulphate), sulphosuccinates  
25 (such as disodium laureth sulphosuccinate), amphotacetates and amphodiacetates (such as disodium cocoamphodiacetate), alkylpolyglucosides and alcohol sulphonates.

25

Broadly in accordance with a further aspect of the present invention there is provided a method of preparing a hair care composition. Optionally any other suitable ingredients may be added such as those described herein. Preferred methods of preparation are described in the examples.

30

Broadly in accordance with a still further aspect of the present invention  
35 there is provided a method of treating hair (for example washing, conditioning and/or styling hair) by application of a composition as described herein.

35

The invention will be understood with reference to the non-limiting tests and formulation examples described hereinafter:

5      **Example 1 - Hair Conditioner**

	Ingredients	%W/W
	Aqua	93.6
10	Cetyl alcohol	3
	Cetrimonium chloride	0.759
	Hydroxyethylcellulose	0.6
	Propylene glycol	0.493
	Panthenol	0.375
15	Parfum	0.3
	Benzophenone-4	0.2
	Sodium chloride	0.15
	Wheat amino acids	0.14
	Amodimethicone	0.105
20	Alcohol denat.	0.095
	Dimethicone propyl PG-betaine	0.09
	Citric acid	0.026
	Tetrasodium EDTA	0.02
	Trideceth-10	0.0045
25	Origanum vulgare	0.009
	Panax ginseng	0.006
	Morus alba	0.0046

30      **Method**

35      **Stage 1**

The EDTA and Hydroxyethylcellulose were added to the water and mixed using a homogeniser to hydrate the polymer. Citric acid, Benzophenone and Cetrimonium chloride were added. This was then heated to 70C.

**Stage 2**

Cetyl alcohol was heated to 70C in a separate vessel.

### Stage 3

5

The melted Cetyl alcohol was then added to stage 1 using a homogeniser.

### Stage 4

10 The mixture was then cooled to below 40C using a prop. Stirrer. The remaining materials including the antioxidant complex were then added and the product was made to weight with purified water.

### 15 Example 2 - Intensive Conditioner

	Ingredients	%W/W
	Aqua	84.2
20	Cetearyl alcohol	4.6
	Arachidyl propionate	2
	Dimethicone	2
	Panthenol	1.5
	Stearamidopropyl dimethylamine	1.5
25	Hydroxyethylcellulose	0.75
	Amodimethicone	0.7
	Citric acid	0.503
	Cetrimonium chloride	0.435
	PEG-20 stearate	0.4
30	Parfum	0.3
	Propylene glycol	0.29
	Benzophenone-4	0.2
	Sodium chloride	0.15
	Wheat amino acids	0.14
35	Polyquaternium-39	0.1
	Alcohol denat.	0.095
	Trideceth-10	0.03

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	BHT	0.025
	Isopropyl alcohol	0.02
	Tetrasodium EDTA	0.02
	Origanum vulgare	0.009
5	Panax ginseng	0.006
	Morus alba	0.0046

#### Method

#### 10 Stage 1

The EDTA and hydroxyethylcellulose were added to the water and mixed using a homogeniser to hydrate the polymer.

#### 15 Stage 2

The citric acid and cetrimonium chloride were added and mixed using a prop. Stirrer.

The mixture was then heated to 70C.

20

#### Stage 3

In a separate vessel, the waxes, dimethicone and BHT were mixed and heated to 70C until melted and uniform.

25

#### Stage 4

Stage 3 was added to stage 2 and this was mixed until uniform. The mixture was then cooled to below 40C with stirring.

30

#### Stage 5

The remaining materials including the antioxidant complex were then added and the product was made to weight using purified water.

35

**Example 3 - Leave In Conditioner**

	Ingredients	%W/W
5	Aqua	94.4
	PEG-40 hydrogenated castor oil	2
	Dipropylene glycol	1
	Phenoxyethanol	0.85
	Parfum	0.4
10	Panthenol	0.375
	Propylene glycol	0.29
	Methylparaben	0.2
	Benzophenone-4	0.2
	Alcohol denat.	0.095
15	Polyquaternium-10	0.091
	Sodium chloride	0.3
	Wheat amino acids	0.028
	Sodium hydroxide	0.026
	Origanum vulgare	0.009
20	Panax ginseng	0.006
	Morus alba	0.0046

**Method****25 Stage 1**

The Polyquaternium-10 was added to the water and hydrated using a prop. stirrer.

**30 Stage 2**

The Methylparaben was pre-dispersed in Dipropylene glycol, gently heated to melt and then added to stage 1.

**35 Stage 3**

The remaining materials including the antioxidant complex were then added and

the product was mixed and made to weight with purified water.

#### Example 4 - Gentle Shampoo

5		
	Ingredients	%W/W
	Aqua	82.25
10	Sodium laureth sulfate	8.25
	Cocamidopropyl betaine	2.8
	Sodium chloride	1.794
	Cocamide DEA	1.63
	PEG-6 cocamide	1
15	Parfum	0.5
	Panthenol	0.375
	Propylene glycol	0.29
	Benzophenone-4	0.2
	Glycerin	0.2
20	Phenoxyethanol	0.162
	Wheat amino acids	0.14
	Alcohol denat.	0.095
	Citric acid	0.05
	Methyldibromo glutaronitrile	0.04
25	Tetrasodium EDTA	0.02
	Origanum vulgare	0.009
	Panax ginseng	0.006
	Morus alba	0.0046

#### 30 Method

##### Stage 1

35 To the water, EDTA, Sodium chloride, Citric acid and Benzophenone-4 were added. This was followed by the addition of Sodium laureth sulfate, Methyldibromo glutaronitrile, wheat amino acids and the antioxidant complex.



## Stage 2

PEG-6 cocamide and Cocamide DEA were heated gently until liquified. The perfume was added and mixed. This was then added to the product.

## Stage 3

The Cocamidopropyl betaine and remaining materials were then added and mixed. The product was made to weight using purified water.

**Example 5 - Anti-Dandruff Shampoo**

	Ingredients	%W/W
15	Aqua	79.3
	Sodium laureth sulfate	5.9
	Disodium laureth sulfosuccinate	4
	Laureth-3	3
20	Cocamidopropyl betaine	2.45
	Sodium chloride	1.926
	Dipropylene glycol	1
	Parfum	0.5
	Piroctone olamine	0.5
25	Panthenol	0.375
	Propylene glycol	0.29
	Disodium phosphate	0.25
	Benzophenone-4	0.2
	Wheat amino acids	0.14
30	Alcohol denat.	0.095
	Citric acid	0.063
	Tetrasodium EDTA	0.02
	Preservative	0.2
	Origanum vulgare	0.009
35	Panax ginseng	0.006
	Morus alba	0.0046

## Method

### Stage 1

5 EDTA, Citric acid and Benzophenone-4 were added and mixed into the water. Sodium laureth sulfate, Disodium laureth sulfosuccinate and Dipropylene glycol were then added.

### Stage 2

10 Disodium phosphate, wheat amino acids and the antioxidant complex were added and the product was stirred until uniform.

### Stage 3

15 The Piroctone olamine was dispersed in the parfum and added to the Laureth-3. This mixture was added to the bulk and stirred.

### Stage 4

20 The remaining materials were then added and the product was made to weight with purified water.

### 25 Example 6 - Anti-Chlorine Shampoo

	Ingredients	%W/W
	Aqua	84
30	Sodium laureth sulfate	7.6
	Cocamidopropyl betaine	2.8
	Sodium chloride	1.694
	Laureth-3	1
	Phenoxyethanol	0.852
35	Parfum	0.5
	Disodium phosphate	0.4
	Panthenol	0.375

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	Propylene glycol	0.29
	Methylparaben	0.2
	Benzophenone-4	0.2
	Wheat amino acids	0.14
5	Propylparaben	0.1
	Sodium thiosulfate	0.1
	Alcohol denat.	0.095
	Sodium hydroxide	0.06
	Sodium phosphate	0.06
10	Tetrasodium EDTA	0.02
	Origanum vulgare	0.009
	Panax ginseng	0.006
	Morus alba	0.0046

## 15      Stage 1

To the water, the following materials were added and mixed; Benzophenone, Sodium chloride, Sodium phosphate, Disodium phosphate, EDTA.

## 20      Stage 2

Sodium laureth sulfate, phenoxyethanol, Panthenol, Wheat amino acids and the antioxidant complex were then added and stirred.

## 25      Stage 3

The preservatives were pre-mixed in the Laureth-3 and heated slightly to melt the powders. This was added to the product.

## 30      Stage 4

The remaining materials were added and the product was made to weight using purified water.

35

**Example 7 - Hair Gel**

	Ingredients	%W/W
5	Aqua	88.45
	Cyclomethicone	6.6
	Dimethiconol	0.9
	Phenoxyethanol	0.8
	Propylene glycol	0.79
10	Panthenol	0.75
	Carbomer	0.7
	Aminomethyl propanol	0.4
	Benzophenone-4	0.2
	Parfum	0.2
15	Alcohol denat.	0.095
	Tetrasodium EDTA	0.05
	Sodium chloride	0.03
	Wheat amino acids	0.028
	Origanum vulgare	0.009
20	Panax ginseng	0.006
	Morus alba	0.0046

**Method****25 Stage 1**

To the water; EDTA and Benzophenone-4 were added using an homogeniser.

**Stage 2****30**

The carbomer was added and hydrated with continued homogenising.

**Stage 3****35**

The Phenoxyethanol, Cyclomethicone, Dimethiconol, Propylene glycol and Panthenol were then added and mixed until homogenous.

---

**Stage 4**

The remaining materials including the antioxidant complex were added and the bulk was homogenised until uniform.

5

**Stage 5**

The product was made to weight using purified water.

10

**Example 8 - Hair Putty**

	Ingredients	%W/W
15	Aqua	50.9
	Cetearyl alcohol	10.9
	Lanolin	7
	PVP	6
	Paraffin	6
20	PVP/VA copolymer	5.7
	Carnauba	3
	Petrolatum	2
	Polyquaternium-11	2
	PEG-20 stearate	1.9
25	Paraffinum liquidum	1
	Propylene glycol	0.8
	Phenoxyethanol	0.6
	Dimethicone	0.5
	Panthenol	0.375
30	Cetrimonium chloride	0.35
	Dimethicone propyl PG-betaine	0.225
	Benzophenone-4	0.2
	Methylparaben	0.12
	Alcohol denat.	0.095
35	Origanum vulgare	0.009
	Panax ginseng	0.006
	Morus alba	0.0046

## Method

### Stage 1

5 To the water, the PVP/VA copolymer, PVP and Benzophenone-4 were added and stirred until homogenous. This was then heated to 70C.

### Stage 2

10 In a separate vessel, the waxes were mixed and heated to 70C until all materials had melted.

### Stage 3

15 The hot waxes were then added to stage 1 and mixed using a prop. Stirrer until homogenous. The mixture was then cooled to below 60C.

### Stage 4

20 The remaining materials, including the antioxidant complex were then added and the product was stirred until uniform.

### Stage 5

25 The product was made to weight using purified water.

### Example 9 - Moisturising Conditioner

Ingredients	%W/W
Aqua	90
35 Cetyl alcohol	4
Dimethicone	2
Hydroxyethylcellulose	0.8

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	Cetrimonium chloride	0.765
	Panthenol	0.75
	Propylene glycol	0.64
	Parfum	0.3
5	Benzophenone-4	0.2
	Amodimethicone	0.175
	Dimethicone propyl PG-betaine	0.15
	Sodium chloride	0.15
	Wheat amino acids	0.14
10	Alcohol denat.	0.095
	Citric acid	0.026
	Tetrasodium EDTA	0.02
	Trideceth-10	0.009
	Origanum vulgare	0.009
15	Panax ginseng	0.006
	Morus alba	0.0046

#### Method

#### 20 Stage 1

To the water, EDTA and Hydroxyethylcellulose were added using homogenising to hydrate the polymer.

#### 25 Stage 2

The benzophenone-4 and Laureth-3 were then added and the bulk was heated to 70C.

#### 30 Stage 3

In a separate vessel, the Cetyl alcohol was heated to 70C until melted.

#### 35 Stage 4

Using an homogeniser, the Cetyl alcohol was added to the bulk and mixed until uniform.

**Stage 5**

The product was cooled and the remaining materials, including the antioxidant complex were then added and mixed.

**Stage 6**

The product was made to weight using purified water.

**Example 10 - Spray Gel**

Ingredients	%W/W
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**Phase 1**

Aqua	40.15
PVP/VA copolymer	4.9
Isopropyl alcohol	2.5
Propylene glycol	2.29
Glycerin	2
Panthenol	0.375
Benzophenone-4	0.2
Sodium chloride	0.03
Wheat amino acids	0.028
Origanum vulgare	0.009
Panax ginseng	0.006
Morus alba	0.0046

**Phase 2**

PEG-40 hydrogenated castor oil	1
Parfum	0.3

**Phase 3**



Alcohol denat.	45
Dimethicone copolyol	1

Method

5

Stage 1

The materials in phase 1 were mixed until uniform using a prop. Stirrer.

10

Stage 2

The materials in phase 2 were pre-mixed and added to phase 1.

Stage 3

15

The materials in phase 3 were mixed and added to the bulk.

Stage 4

20

The product was made to weight using purified water.

**Example 11 - Dry Scalp Shampoo**

25	Ingredients	%W/W
	Aqua	86
	Sodium laureth sulfate	7
	Sodium chloride	2.23
30	Cocamidopropyl betaine	1.96
	Laureth-3	1
	Panthenol	0.375
	Propylene glycol	0.29
	Piroctone olamine	0.25
35	Benzophenone-4	0.2
	Phenoxyethanol	0.162
	Wheat amino acids	0.14

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	Polyquaternium-39	0.1
	Alcohol denat.	0.095
	Citric acid	0.06
	Methyldibromo glutaronitrile	0.04
5	Tetrasodium EDTA	0.02
	Origanum vulgare	0.009
	Panax ginseng	0.006
	Morus alba	0.0046
10	Method	
	Stage 1	
15	To the water, EDTA, Citric acid, Benzophenone-4 and Sodium chloride were added and mixed using a prop. Stirrer until all materials were dissolved and uniform.	
	Stage 2	
20	The Sodium laureth sulfate and Piroctone Olamine were then added and stirred until homogenous.	
	Stage 3	
25	The remaining materials, including the antioxidant complex were then added and the product was stirred until uniform and homogenous.	
	Stage 4	
30	The product was made to weight with purified water.	

**Example 12 - Deep Cleaning Shampoo**

	Ingredients	%W/W
5	Aqua	79
	Sodium laureth sulfate	14.13
	Sodium chloride	2.72
	Cocamidopropyl betaine	1.4
	PEG-6 cocamide	1
10	Parfum	0.5
	Panthenol	0.375
	Propylene glycol	0.29
	Benzophenone-4	0.2
	Phenoxyethanol	0.162
15	Wheat amino acids	0.14
	Alcohol denat.	0.095
	Methyldibromo glutaronitrile	0.04
	Citric acid	0.02
	Tetrasodium EDTA	0.02
20	Origanum vulgare	0.009
	Panax ginseng	0.006
	Morus alba	0.0046

**Method**

25      Stage 1

To the water, Citric acid, EDTA and Sodium chloride were added and dissolved.

30      Stage 2

The Benzophenone-4, Sodium laureth sulfate, Cocamidopropyl betaine, Panthenol, Methyldibromo glutaronitrile, Wheat amino acids and the antioxidant complex were then added and mixed until the product was uniform, using a

35      prop. Stirrer.

Stage 3

The parfum was pre-dispersed in the PEG-6 cocamide and then added to the bulk.

5      Stage 4

The product was made to weight using purified water.

10     Example 13 - Moisturising Shampoo

	Ingredients	%W/W
	Aqua	82
	Sodium laureth sulfate	8.24
15	Cocamidopropyl betaine	2.8
	Cocamide DEA	1.63
	Panthenol	1.5
	Sodium chloride	1.5
	Laureth-3	1.194
20	Parfum	0.5
	Propylene glycol	0.5
	Polyquaternium-10	0.273
	Glycerin	0.2
	Wheat amino acids	0.14
25	Alcohol denat.	0.095
	Dimethicone propyl PG-betaine	0.09
	Citric acid	0.04
	Tetrasodium EDTA	0.02
	Origanum vulgare	0.009
30	Panax ginseng	0.006
	Morus alba	0.0046

Method

35     Stage 1

To the water, the EDTA and Polyquaternium-10 were added and the polymer

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was hydrated using an homogeniser.

#### Stage 2

- 5 The Citric acid, Sodium chloride and Benzophenone-4 were added and stirred until uniform.

#### Stage 3

- 10 The remaining materials, including the antioxidant complex were added individually and the product was mixed using a prop. Stirrer until homogenous.

#### Stage 4

- 15 The product was made to weight using purified water.

#### Example 14 - Extra Hold Hair Gel

20	Ingredients	%W/W
	Aqua	93
	PVP/VA copolymer	1.9
	Propylene glycol	1.29
25	Carbomer	1
	PEG-40 hydrogenated castor oil	1
	Panthenol	0.375
	Sodium hydroxide	0.26
	Parfum	0.2
30	Phenoxyethanol	0.16
	Tetrasodium EDTA	0.15
	Mica	0.113
	Cystine hydroxypropyl polysiloxane	0.1
	Alcohol denat.	0.095
35	Methyldibromo glutaronitrile	0.04
	Sodium chloride	0.03
	Wheat amino acids	0.028

Benzophenone-2	0.025
Origanum vulgare	0.009
Panax ginseng	0.006
Morus alba	0.0046

5 Method

Stage 1

10 The EDTA, Methyldibromo glutaronitrile, PVP/VA copolymer and Carbomer were added to the water and mixed using a homogeniser to ensure that the polymers were hydrated.

Stage 2

15 With continued homogenising, the Cystine hydroxypropyl polysiloxane was added and mixed into the product.

Stage 3

20 The remaining materials, including the antioxidant complex were added individually and mixed using a prop. Strirrer until the product was homogenous.

25 A number of trials were conducted to demonstrate the efficacy of the synergistic combinations of anti-free radical agents.

*In Vitro* Tests

30 Linoleic acid (model skin and hair lipid) was incubated in the presence of various antioxidants and antioxidant combinations and was exposed to broad spectrum UVA/B to induce oxidation of the lipid. Following extraction of the lipid into methanol, the degree of lipid hydroperoxides (free radical generated damage) formed were measured with a specific colorimetric biochemical test.

35 The degree of protection afforded by the antioxidants was thus measured and compared to unirradiated and irradiated vehicle controls.

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Results showed a statistically significant reduction in the amount of lipid hydroperoxide present of up to 79% in those samples treated with the claimed synergistic anti free-radical combinations when compared to the control samples.

5

### *In Vivo Tests*

10

Test formulations were applied to either skin or hair swatches. For skin, an adhesive disc was applied to the skin to sample skin cells and irradiated with broad spectrum UVA/B to induce oxidation of the lipid. Following extraction of the lipid into methanol, the degree of lipid hydroperoxides (free radical generated damage) formed were measured with a specific colorimetric biochemical test. The degree of protection afforded by the antioxidants was thus measured and compared to unirradiated and irradiated vehicle controls.

15

For hair, the swatch was directly irradiated and processed as above.

This combination of testing methodologies allowed us to test antioxidant combinations for synergistic activity.

20

Results showed a statistically significant reduction in the amount oxidative damage due to free radicals of up to 83% in those samples treated with the claimed synergistic anti free-radical combinations when compared to the control samples.

25

### *Sensory analysis*

30

Swatches of hair treated with either base formulation or formulations containing antioxidants were assessed by an expert panel for factors such as shine, softness, static, ease of combing, gloss and overall feel. Statistical analysis was used to determine whether antioxidants were able to protect and enhance these properties.

The results showed an improvement in shine and feel.

